



Patents 2003

John Svoboda and *John Morrison* collaborated on research that produced a patent, entitled **Differential Capacitance Probe for Process Control Involving Aqueous Dielectric Fluids**, for a process control probe for aqueous fluids. A function of the process control probe is to monitor, in real-time, processes where small differences in critical elements of the process are controlled. This technology is applicable for food processing and paper mill operations.

A patent was awarded for a method that encapsulates and preserves microorganisms for an extended period of time. *Rob Rogers, Melinda Hamilton, Lee Nelson, Jennifer Benson, Martin Green* and *Timothy Milner* are credited for this patented technology, which can be applied to the biodecontamination of concrete surfaces. The decontamination process takes place using a naturally occurring microbiological process known as microbially influenced degradation. **Encapsulation Method for Maintaining Biodecontamination Activity** is applicable for use on concrete floors, walls, unlined reactor pools, and rubble.

A team of inventors, *Tyler Gomm, Nancy Kraft, Larry Phelps*, and *Steven Taylor*, developed an **Ultrasonic Fluid Quality Sensor System** for determining the composition and flow of fluid for which a patent issued in fiscal year 2003. The team collaborated with *Jason Mauseth* on a second patent, titled **Ultrasonic Flow Metering System**, which provides an electronic method for measuring the density, flow velocity, and mass flow of a fluid.

Arthur Watkins is the sole inventor of an improved, more cost-effective method for marking and monitoring a down-hole line used for environmental monitoring. He was also a named inventor on a patent for a technology comprised of a temperature sensing system with failure recognition. *Arthur* collaborated with his colleagues *Collins Cannon* and *Charles Tolle* for this second patent titled **Device and Method for Self-Verifying Temperature Measurement and Control**.

The Department of Energy's Waste Management program funded work that led to a patent, entitled **Novel Solvent for the Simultaneous Recovery of Radioactive Nuclides from Liquid Radioactive Wastes**, which describes a process for the selective extraction of radionuclides from radioactive waste. This process offers the benefit of completing decontamination of the waste in a single process, which results in a significant reduction in capital and operating costs. *A team of Russian scientists* and two INEEL researchers, *Terry Todd* and *Ken Brewer*, partnered to develop this technology.

Dieter Knecht, Troy Tranter, and DOE inventor *Jenya Macheret* collaborated with a group of international scientists on the patent titled **Method for Solidification of Radioactive and Other Hazardous Waste**. The technology provides a method for solidifying radioactive waste using microscopic coal ash in a calcination process. This patented method can be used in immobilizing, transporting, decontaminating and disposing of extremely hazardous waste containing heavy metals.

A process titled **Method of Treating Contaminated HEPA Filter Media in Pulp Process** protects the environment by dramatically reducing the amount of waste that must be stored in repositories was patented in fiscal year 2003. The patent provides a method for removing contamination from HEPA filters so that the filters do not become classified as radioactive waste. This patent is credited to the effort of *Jian Hu, Mark Argyle, Rick Demmer, and Emilio Mondok*.

The collaborative team of *Charles Allen, Mark Argyle, Robert Fox, Daniel Ginosar, Stuart Janikowski, Dave Miller, Alan Propp, and William Toth* earned two patents in fiscal year 2003. The first patent, entitled **Method for Modifying Monofilaments, Bundles of Monofilaments, and High Strength Fibrous Material**, describes a continuous process that uses supercritical fluids instead of hazardous solvents to apply coatings onto fibers and filamentous materials. Some of the many potential applications include applying lubricating, water resistant, protective coatings to poly/cotton threads and yarns; protective coatings to cables; abrasion resistant visible coatings to fishing line; and protective or conductive coatings to composite fibers. The second patent that issued describes the equipment necessary to implement the process described in the first patent and is titled **System Configured for Applying a Modifying Agent to a Non-Equidimensional Substrate**.

A technology for analyzing the properties of paper or other sheet materials during the manufacturing process was conceived by *Ken Telschow and Vance Deason*. The patent is titled **Method and Apparatus for Assessing Material Properties of Sheet-Like Materials**. The technology provides a real-time assessment of material properties, thus making it easier to provide “on the fly” measurements and make adjustments to achieve optimum quality of the finished product.

Providing significant improvement to the productivity of fabricating welds in products such as offshore oil and gas pipelines was the outcome of research conducted by *John Johnson, Eric Larsen, Karen Miller, Herschel Smartt and Timothy McJunkin*. Their collaboration resulted in a patent for the method for ultrasonically inspecting the quality of an arc weld on a pass-by-pass basis, as the weld is being made. A **Method for the Concurrent Ultrasonic Inspection of Partially Completed Welds** is unique in that it ultrasonically inspects welds at high temperatures without requiring a liquid couplant.

An exclusive license was granted to Optisense Network, Incorporated for a suite of technologies that describes a compact, easily installed, high voltage sensor intended to replace bulky and expensive current transformers currently used in the electrical power transmission industry. *Gregory Woods, Todd Renak, James Davidson and Thomas Crawford* are responsible for the patent titled **Electro-Optic Voltage Sensor with Beam Splitting**. A second patent builds upon previous **Electro-Optic High Voltage Sensor** technology and is the work of James Davidson and Gary Seifert.

The collaborative efforts of *Donna Marts, Stacey Barker, Andrew Wowczuk, and Thomas Vellenoweth* led to a patent for the **Retractable Barrier Strip**. The technology is a portable barrier strip with retractable tire-puncture spikes for puncturing a vehicle tire. The spikes on the retractable strip can be placed in either vertical or horizontal positions, allowing law enforcement personnel to lay the strip across the road far in advance of the approach of a fleeing vehicle. The Retractable Barrier Strip technology is being used by law enforcement agencies throughout the world.

A team of inventors, *Reed Hoskinson, John Svoboda, J. Wayne Sawyer, and Richard Hess*, and the Ashton, Idaho, farmer *John Hess*, is named on a patent that provides for a soil characteristic analysis system. This system, titled **Measuring Spatial Variability in Soil Characteristics**, acquires, stores, analyzes, and maps soil characteristic data, such as moisture and nutrient content, as farm implements pass through a field during routine agricultural work.

Another agricultural related patent titled **Systems and Methods for Autonomously Controlling Agricultural Machinery**, was awarded. The patented technology is a computer system that optimizes the operation of a grain combine by reducing grain loss and improving yield. *Reed Hoskinson, Dennis Bingham, John Svoboda and Richard Hess* are the inventors named on this patent.

A collaborative team including *Chuck Mohr*, *Greg Mines*, and *Kit Bloomfield* devised a system for the continuous removal of unwanted gasses from power plant heat exchangers containing organic fluid. **A Method and Apparatus for Removing Non-Condensable Gas from a Working Fluid in a Binary Power System** enhances power production and decreases air emissions. The Department of Energy's Office of Energy Efficiency and Renewable Energy funded the research.

A simplified, high flow-rate system for removing metal ions from a waste stream is covered by the patent titled **Ion Processing Element with Composite Media**. This invention allows for convenient concentration of contaminants in the field, simplifying transport to a laboratory for analysis. The invention can be tailored for a wide range of metal ions, from radioactive contaminants in liquid waste or surface water to arsenic in drinking water. The inventors named on this patent are *Nick Mann*, *Troy Tranter*, *Terry Todd* and *Ferdinand Sebesta*.

Joel Hubbell and *Buck Sisson* are responsible for two technologies patented in fiscal year 2003. The first patent, titled **Self-Compensating Tensiometer and Method**, is a self-correcting and longer-lasting soil water measurement system that also records atmospheric pressure changes. The second patent provides a more cost-effective way to retrieve samples from a ground water monitoring device and is titled **A Method of Retrieving a Liquid Sample, a Portable Suction Lysimeter, a Lysimeter System and a Deep Lysimeter**.

A means for extracting and reusing the chemicals used to remove pollution from groundwater was patented in fiscal year 2003. The extraction method, called a **Method and System for Extraction of Chemicals from Aquifer Remediation Effluent**, uses a critical fluid for the separation and recovery of chemicals employed in remediating groundwater contaminated with hazardous organic substances. The recovered chemicals can be recycled to the remediation process or stored for later use. *Ryan McMurtrey*, *Daniel Ginosar*, *Kenneth Moor*, *Mike Shook* and *Donna Barker* are the inventors named on this patent.

Another patent that reflects the breadth of INEEL research interests describes a technology that may one day provide an effective treatment for AIDS. The patent, titled **Selective Destruction of Cells Infected with Human Immunodeficiency Virus**, is based on the work of *William Keener* and *Thomas Ward*. The technology is a variant of a protein synthesis-inactivating toxin that selectively kills infected cells containing a viral protease. A preferred embodiment of the invention is specific for human immunodeficiency virus and uses ricin as the ribosome-inactivating protein.

Mason Harrup, *John Wey*, and *Eric Peterson* collaborated on a patented technology that provides a more efficient and environmentally friendly method for removing toxic metals from water. The **Solid-Phase Materials for Chelating Metal Ions and Methods of Making and Using Same** technology can be used to recover copper from mining and plating industry process streams and to replace costly and toxic solvent extraction steps in conventional copper processing.

The **Self-Doped Molecular Composite Battery Electrolytes** patent was the collective effort of the INEEL inventors, *Mason Harrup*, *Alan Wertsching*, and *Fred Stewart*. The technology is one in a suite of technologies that combined, are the basis for a superior, commercially useful solid polymer battery. The technologies have received interest from both military and national security officials who see them as having great potential for use in future intelligence missions.

A patent issued for a technology that reduces two-cycle engine exhaust emissions to levels acceptable by the EPA. The patented technology, titled an **Apparatus for the Liquefaction of Natural Gas and Methods Related to Same**, is a small separator that removes unburned oil and gas from the exhaust streams. The inventors are *Terry Turner*, *Bruce Wilding*, *Michael McKellar* and *Kevin Raterman*. An Idaho State University team of engineering students is evaluating this technology for possible use in their entry to the Clean Snowmobile Challenge sponsored by the Society of Automotive Engineers. The Challenge is a multi-school competition to modify stock snowmobiles to produce fewer emissions and less noise, without sacrificing power.

The Department of Energy Office of Fossil Energy funded the INEEL research that resulted in a novel method for producing epoxides using bacteria. The patent titled **Microbial Production of Epoxides** was the result of collaboration between *Thomas Clark* and *Francisco Roberto*.

Two INEEL inventors, *Kevin Kostelnik* and *John Richardson*, along with their *Japanese partners* from Obayashi Corporation, are credited for the **Advanced Containment System** patent. This technology provides a means of installing a floor beneath existing landfills or other contaminated sites. The containment system involves a series of interlocked parallel tubes that separate buried contaminants from the surrounding environment. A license agreement was executed between Bechtel BWXT Idaho, LLC and Obayashi Corporation for this technology. Patent protection is also being pursued in Japan.

Eric Peterson, *Doug Marshall*, and *Mark Stone* are the named inventors on the patent titled **Solution Dewatering with Concomitant Ion Removal**. This technology employs a specially designed pipe that lets water pass through its walls while trapping unwanted metal atoms. Many industrial processes involve the removal of water from a process stream or the removal of contaminants from water streams before water can be reused or released. Dewatering capability is vital to the mining, chemical, and pharmaceutical industries as well as many environmental and waste remediation efforts.

A patent was granted that provides a method for reactivating deactivated solid alkylation catalysts. This novel reactivation method will allow the petroleum refiners to eliminate very hazardous concentrated mineral acids by replacing them with safe solid catalysts. This will result in significantly reducing safety, human health, and environmental risks associated with the production of high-octane gasoline. The inventors of this technology include *Daniel Ginosar*, *David Thompson*, *Kyle Burch*, *David Zalewski* and *Robert Fox*. In 2003, the **Method and Reactivating Solid Catalysts Used in Alkylation Reactions** technology was nominated by the INEEL for an R&D 100 award. The technical team gave four scientific presentations on the technology and had one manuscript accepted for publication.

Peter Kong and *Brent Detering* teamed to patent a method and device that synthesizes and recycles syn-gas from engine exhaust fumes, which gives the engine more power and reduces emissions. This technology is titled **Plasma Reforming and Partial Oxidation of Hydrocarbon Fuel Vapor to Produce Synthesis Gas and/or Hydrogen Gas**.

The collective efforts of *Dennis Bingham*, *Bruce Wilding*, *James O'Brien*, *Ali Siahpush*, and *Kevin Brown* are credited for two patents that issued in fiscal year 2003. The first patent is **Systems and Methods for Delivering Liquefied Gas to an Engine**, or LNG, vehicle fuel system that is a more practical fuel for everyday use. This technology increases the amount of fuel that can be stored on a vehicle by up to 20%. The second patent, titled **Systems and Methods for Delivering Liquefied Natural Gas to an Engine** is a liquefied natural gas delivery system that dispenses either liquefied gas or gas vapor, depending on the needs of the vehicle. This technology improves on the previous patent.

The technology that is considered to be the heart of the LNG suite of technologies was also awarded a patent in fiscal year 2003. This patent, titled **Apparatus For The Liquefaction Of Natural Gas And Methods Related To Same**, recognizes the efforts of *Bruce Wilding*, *Dennis Bingham*, *Michael McKellar*, *Terry Turner*, *Kevin Raterman*, *Gary Palmer*, *Kerry Klingler*, and *John Vranicar*. The invention is an apparatus for economically liquefying natural gas while using little external energy.